



Effects of open spaces within forests on spider and hoverfly diversity

Anne Oxbrough, Tom Gittings, Paul Giller, John O'Halloran,
Tom Kelly

BIOFOREST Project, Environmental Research Institute, Department Zoology,
Ecology and Plant Science, University College Cork

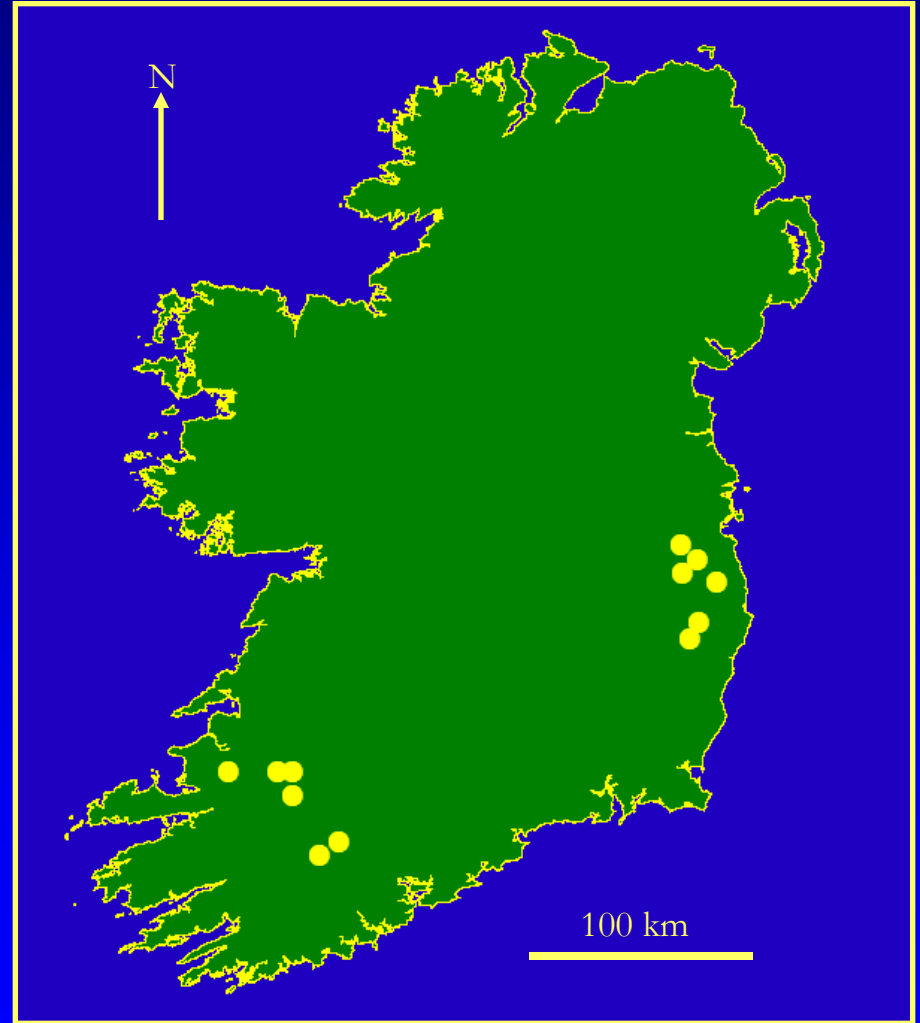


Open space in forest plantations

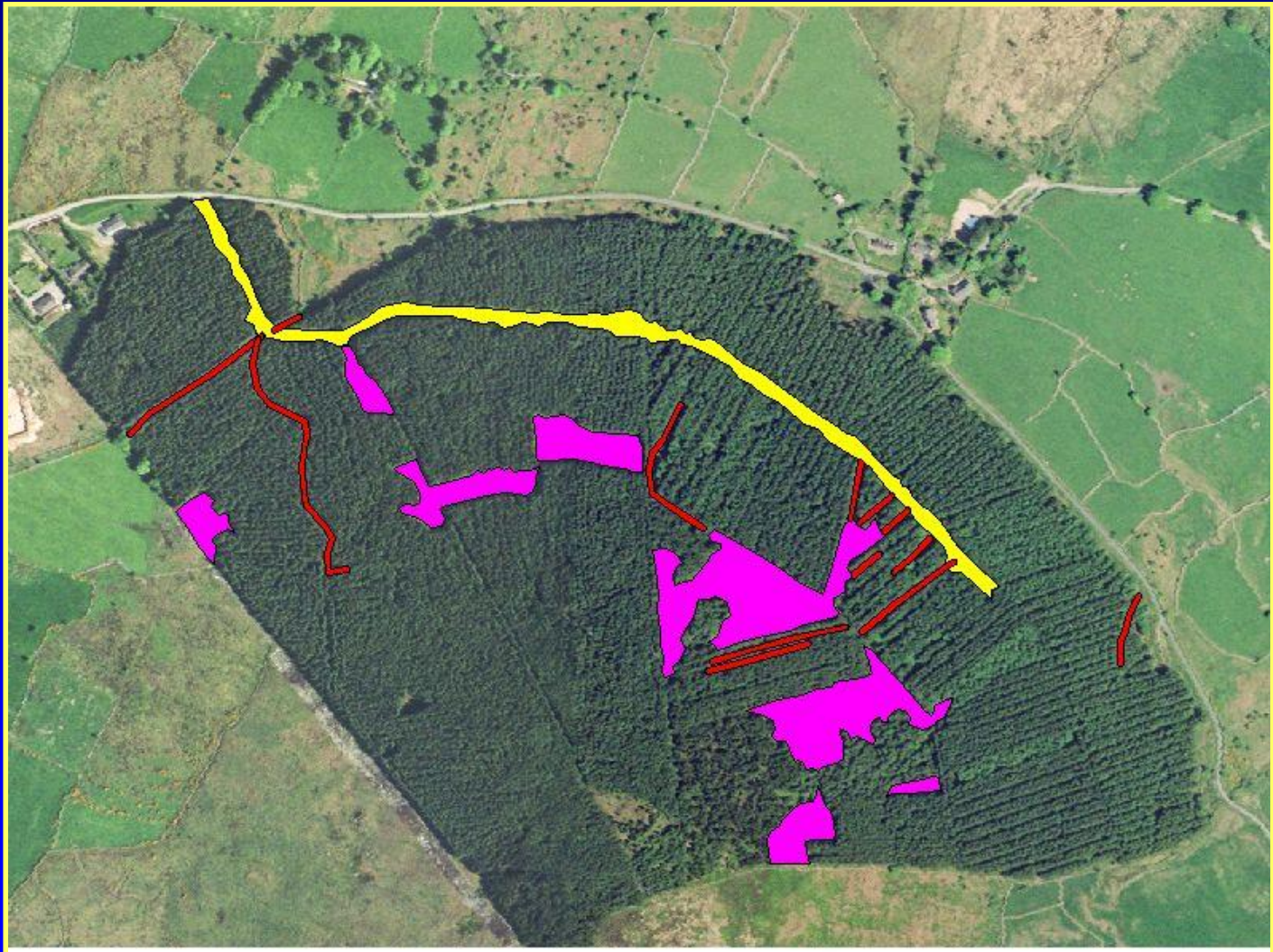
- Irish *Forest Biodiversity Guidelines*:
 - ‘15% of the forest area must be treated with regard to Biodiversity’
 - 5-10% open space
 - 5-10% retained habitats
- What areas should be kept as open space (OS)?
 - What does OS add to invertebrate fauna?
 - What types of OS?
 - What size of OS?

Sampling design

- 2 Geographical clusters
- 12 Sites
- Mature Sitka spruce
- 60 plots



Study sites and open space



Road

Glade

Ride

Invertebrate sampling

Spiders: Pitfall traps

- Plastic cup
- 10 traps per plot
- Transect into forest
- 5 OS sampled/site



Hoverflies: Malaise traps

- Two OS sampled/site
- 2 traps in road
- 2 traps in glade

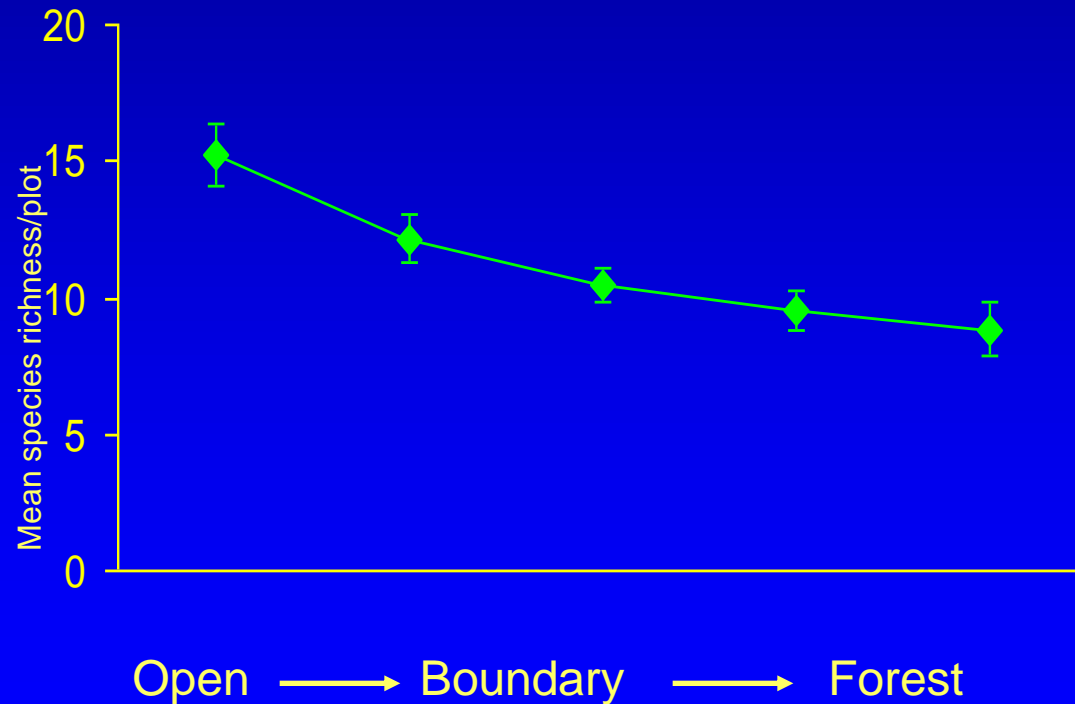


Does open space add to invertebrate diversity in forest plantations?

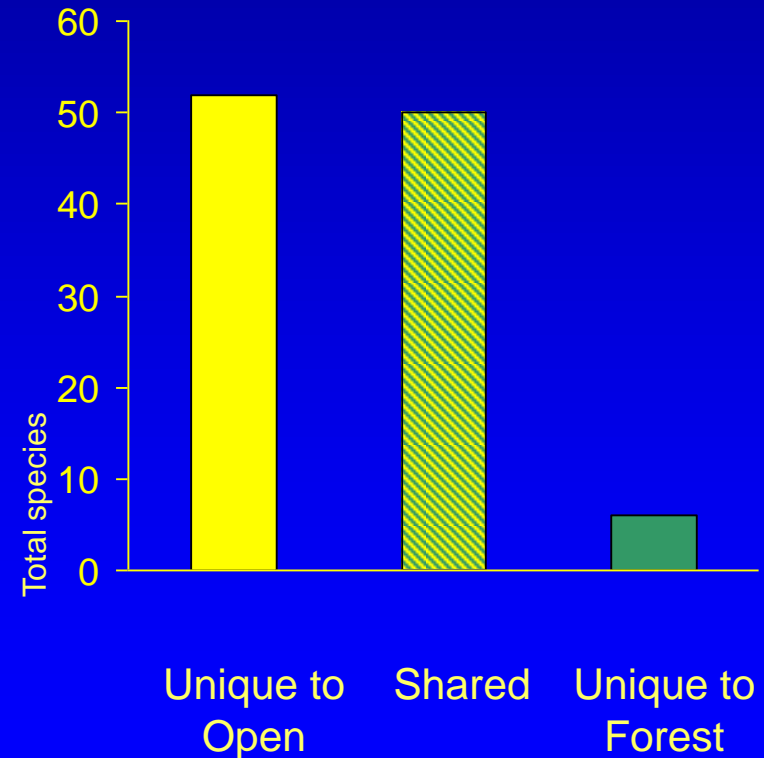


Spiders across the open-forest boundary

Number of species

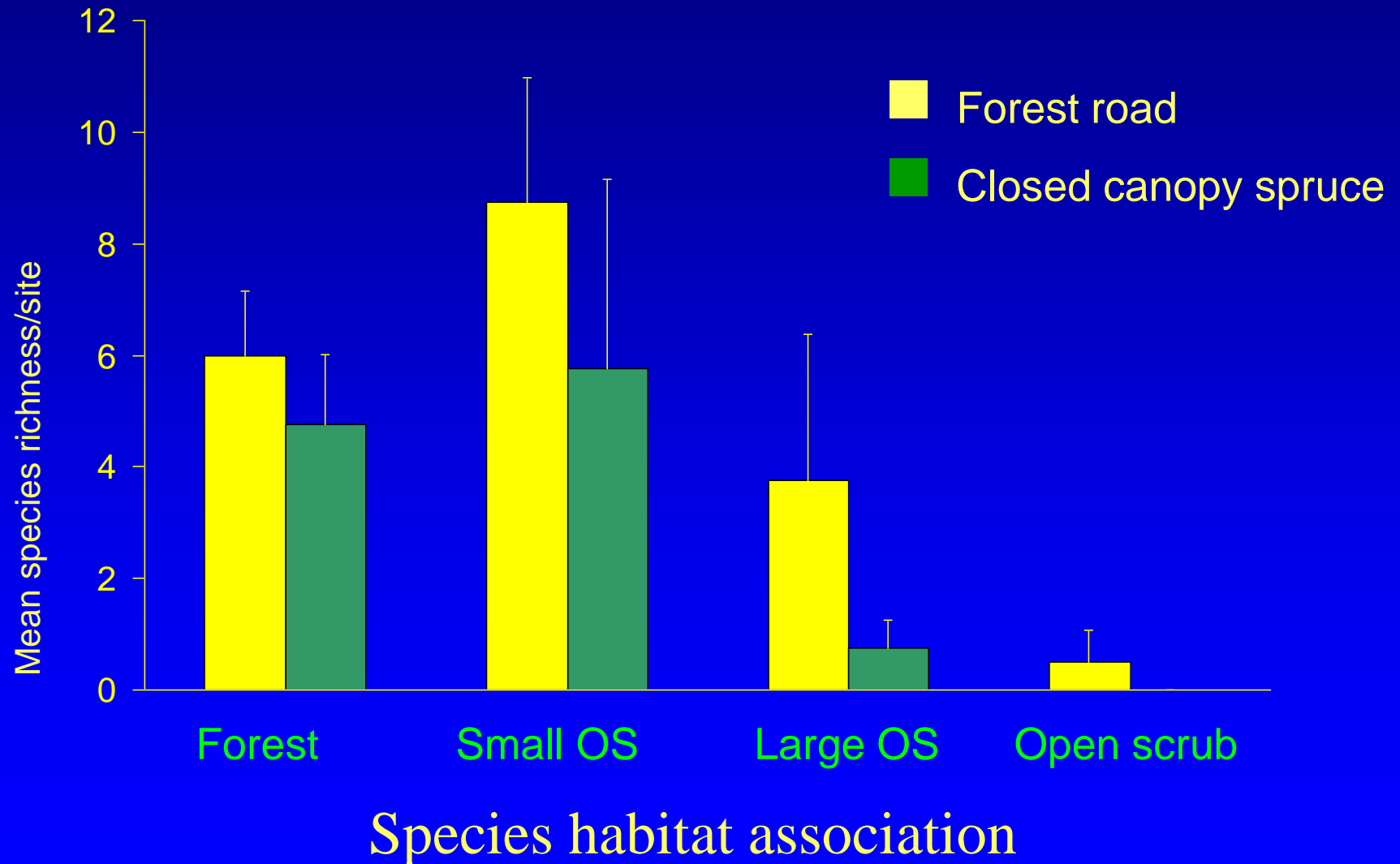


Unique species



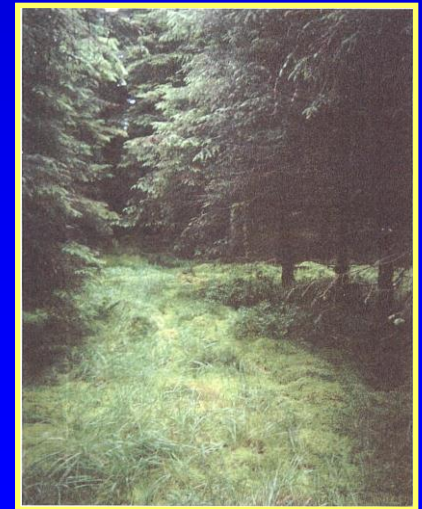
(Bars indicate 2 standard errors, n = 12)

Hoverflies in open space and the forest interior

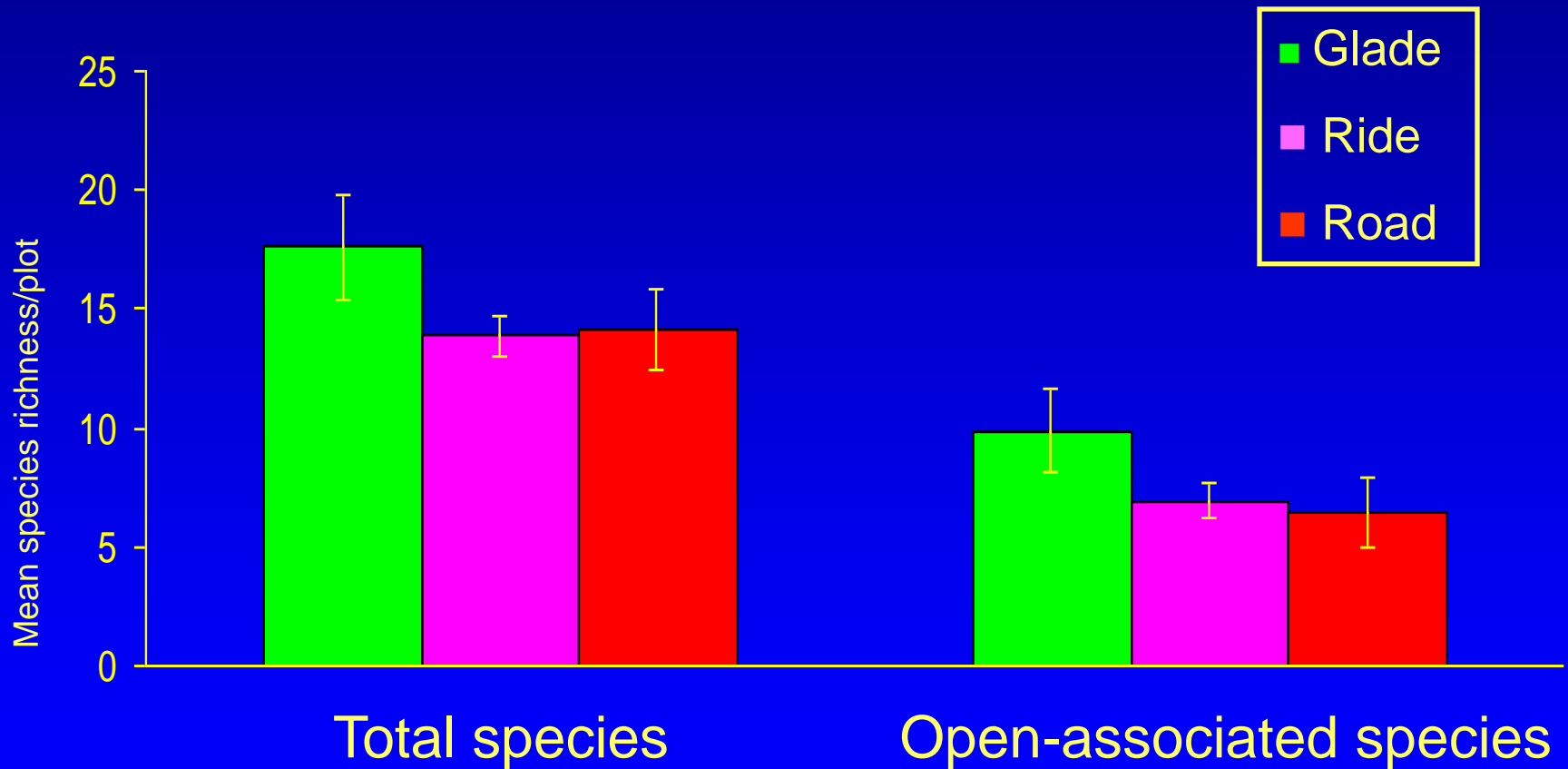




Does open space type influence
invertebrate diversity?

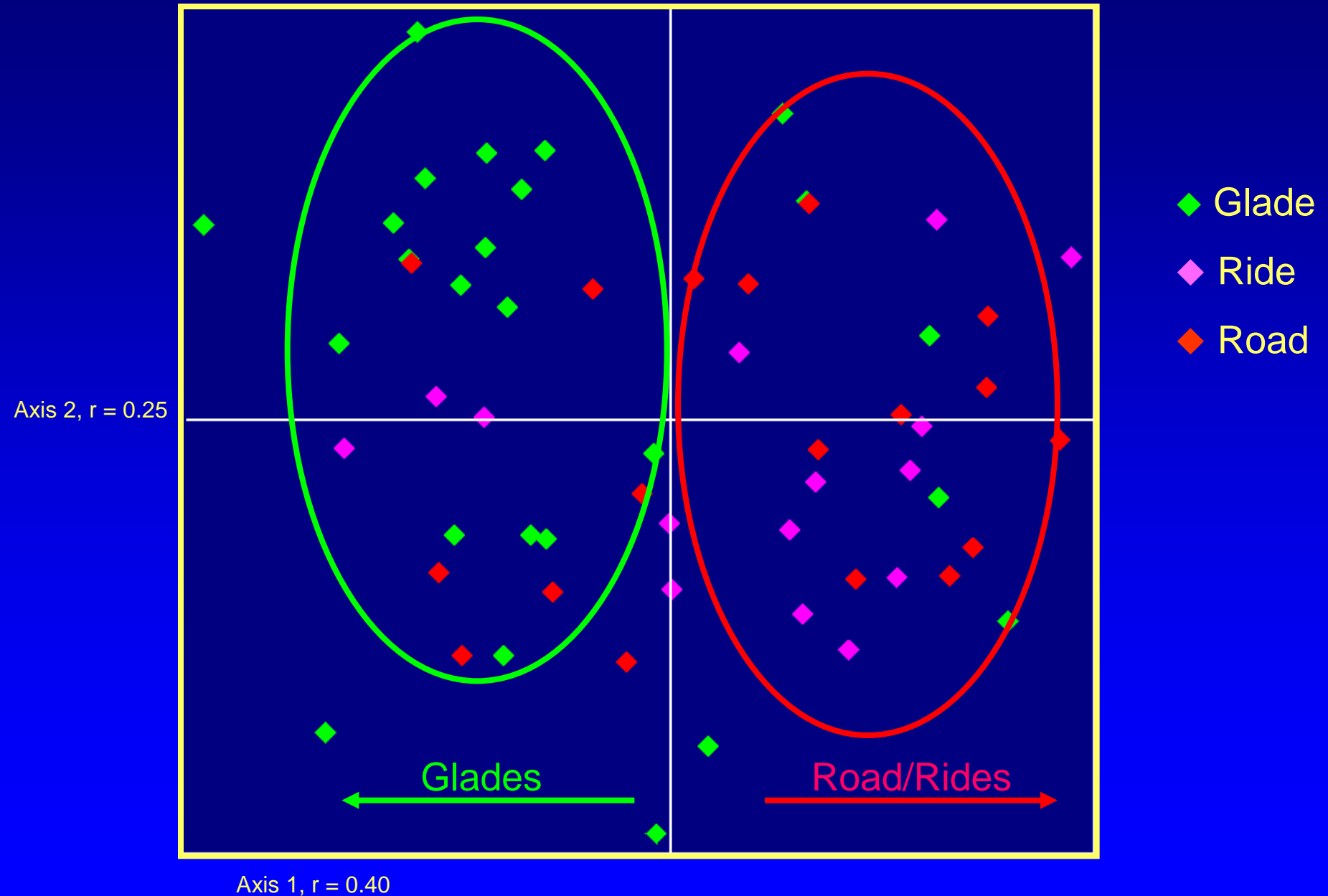


Spiders species richness among OS types

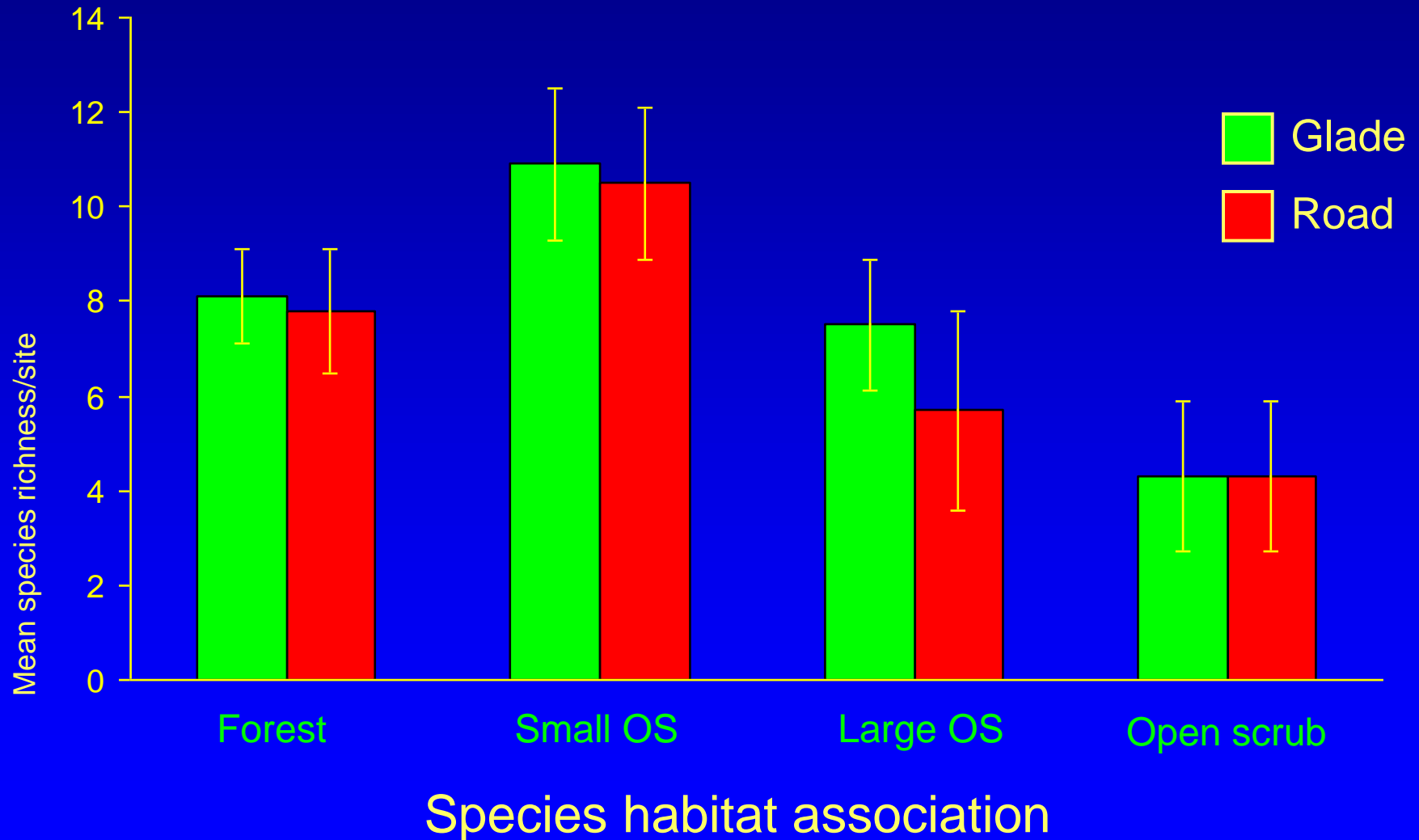


Bars indicate 2 standard errors

Spider assemblages among OS types

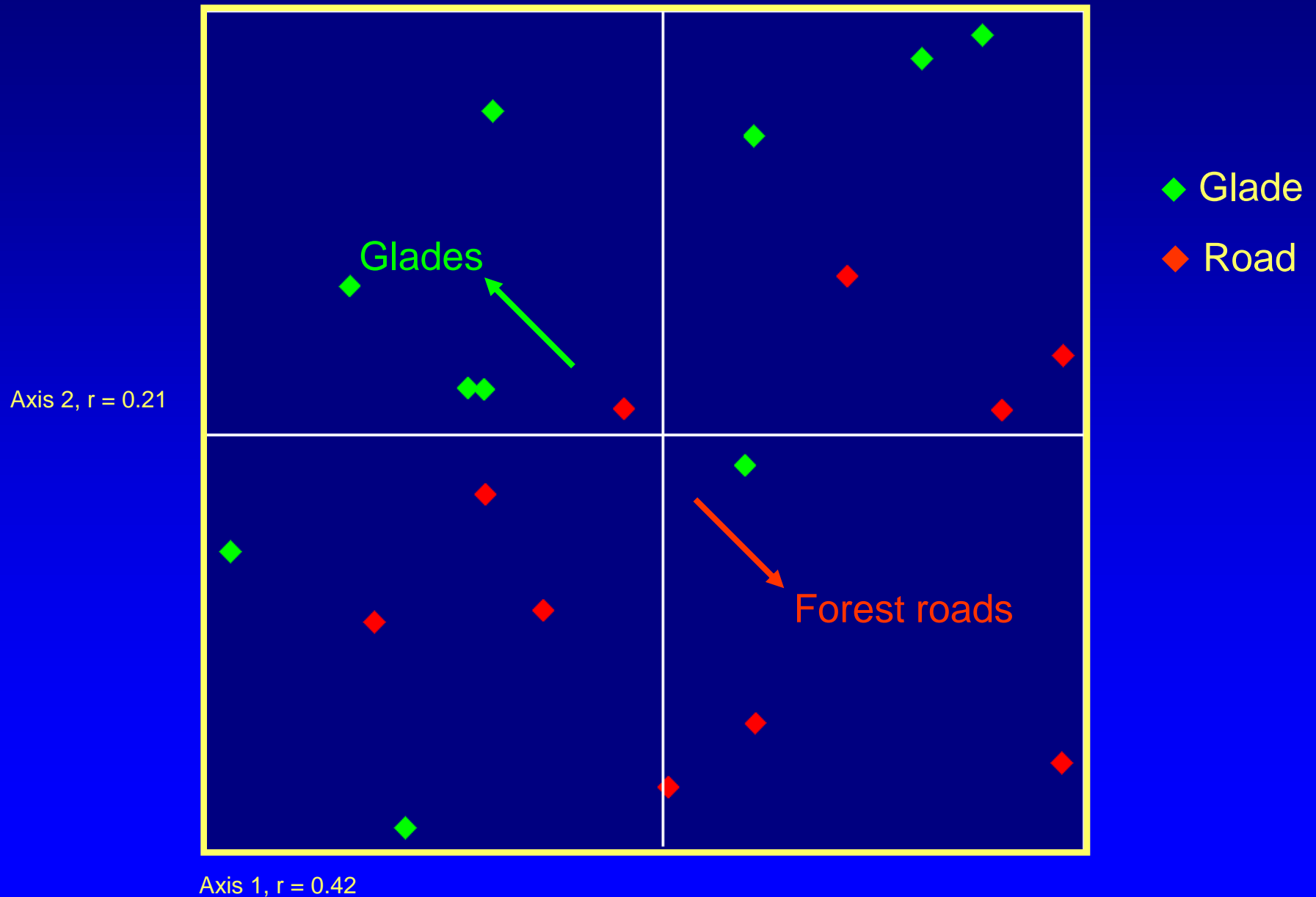


Hoverfly species richness among OS types



Bars indicate SD

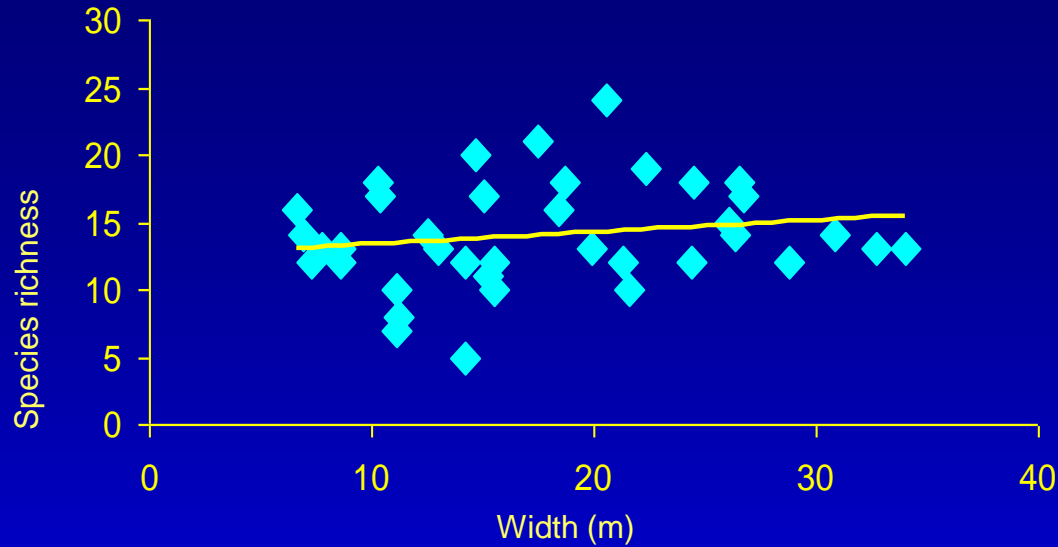
Hoverfly assemblages among OS types



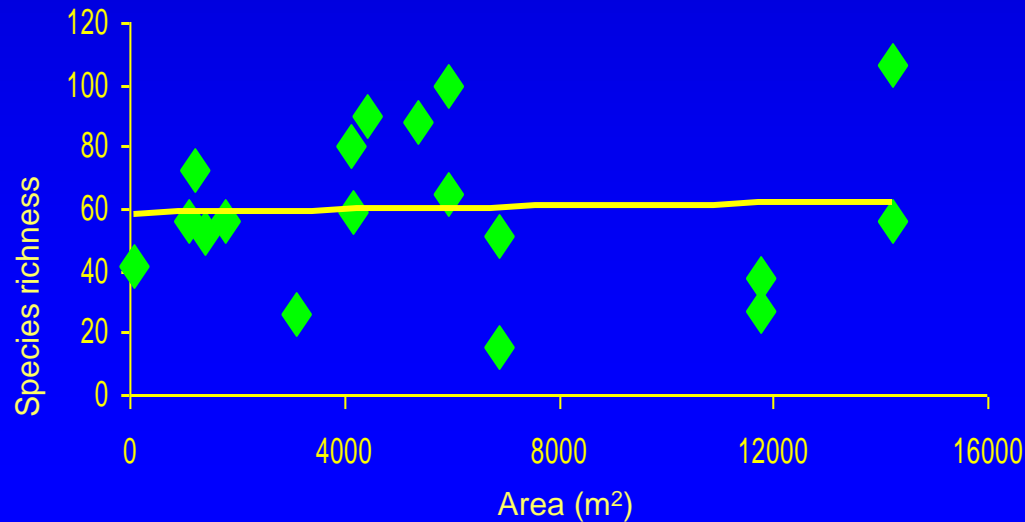
Does open space size effect invertebrate diversity?



Spiders: ride/road width and species richness

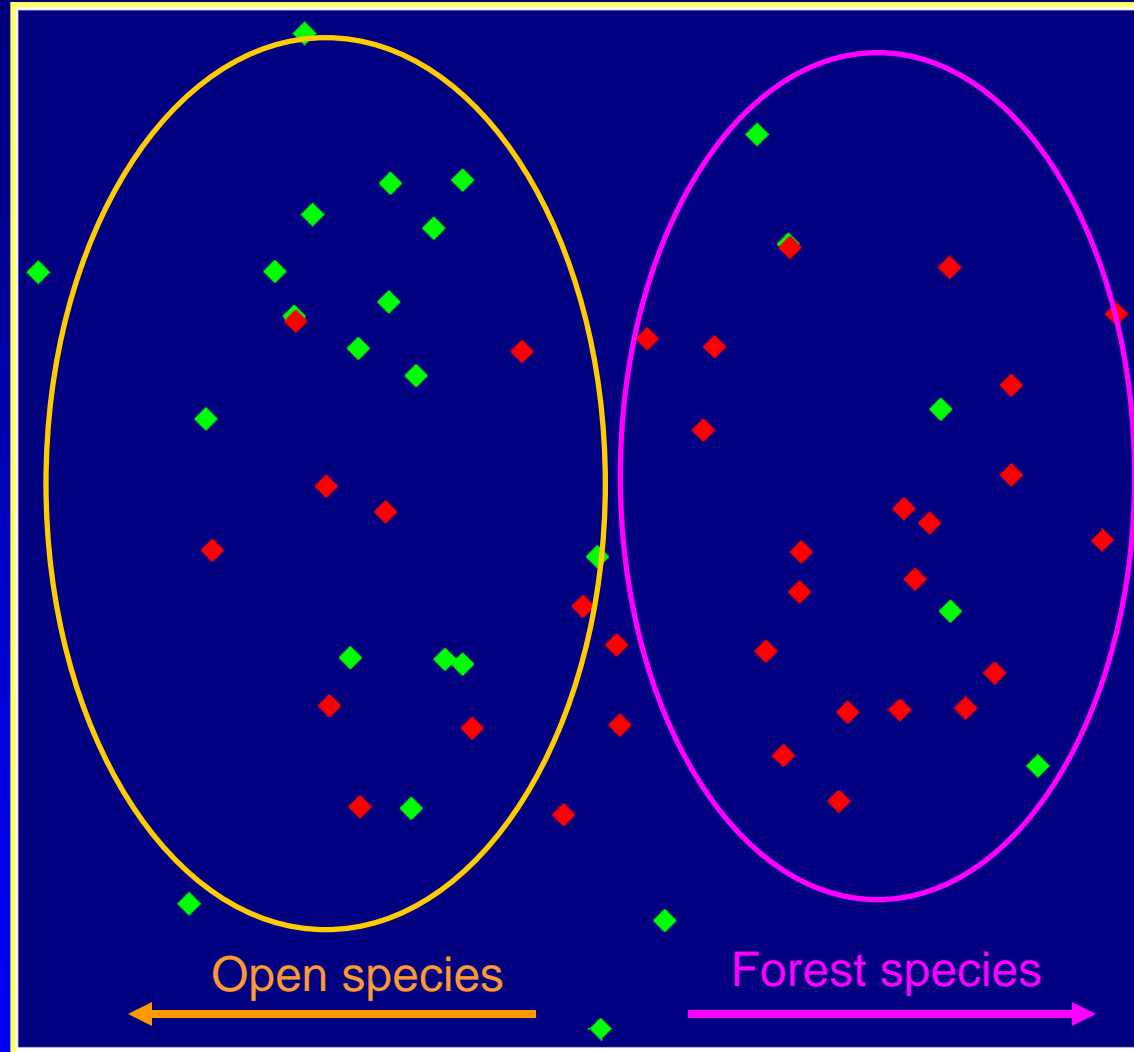


Glade area and species richness



Spider assemblages and open space size

Roads/Rides
> 15m wide
AND
Open habitat
type
(no canopy)



Roads/Rides
< 15m wide

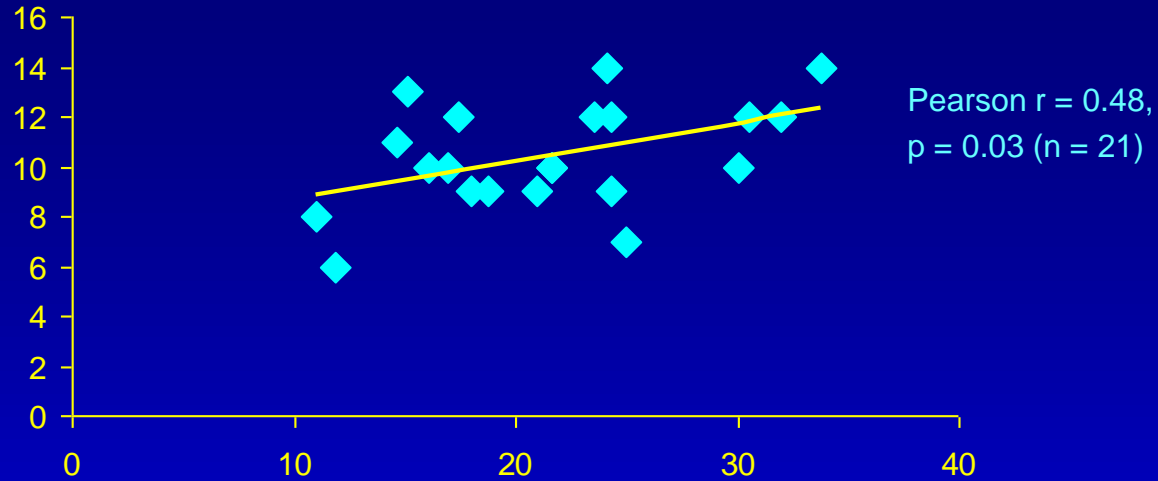
OR

Canopy of
shrubs/
deciduous
woodland

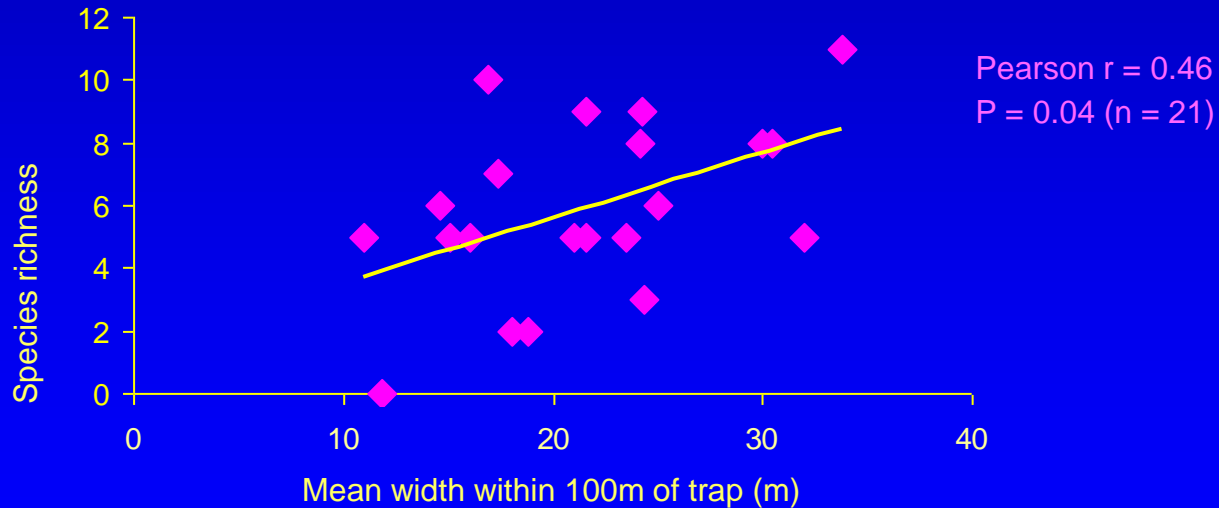
- Roads/Rides < 15m does not support an open fauna
- Open space habitat type important – glades with canopy

Hoverflies: road width and species richness

Small OS



Large OS



- No relationship with glade area and species richness

Conclusions

- Open space adds to species assemblages of plantations
 - Species unique to open habitats are supported
- Glades support more species than rides/roads
 - Spiders and hoverflies
 - Glades support a more open fauna

Conclusions

- Spiders:

- No linear relationship between OS size and species richness
- Rides and roads with a width $< 15\text{m}$ and glades with a canopy
 - Under the influence of the canopy
 - Cannot support open species
- Rides and roads with a width $> 15\text{m}$ and glades without a canopy
 - Can support open species

- Hoverflies:

- Positively related to road width



Acknowledgements



- My colleagues on the BIOFOREST project
- Blathnaid O'Loughlin for help in the field
- Bob Johnston and Peter Merrett for help with identification of difficult specimens
- Thanks to Ed Nieuwenhuys for use of photographs from the website [//www.xs4all.nl/](http://www.xs4all.nl/).
- This work was carried out as part of the BIOFOREST Project ([//bioforest.ucc.ie/](http://bioforest.ucc.ie/)) which is funded by the Environmental Protection Agency and the National Council for Forest Research and development (COFORD) of Ireland through the National Development Plan